APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/032,859	12/28/2001	Alan Gatherer	TI-32753	7120

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EXAMINER	
ABRAHAM, ESAW T	

ART UNIT	PAPER NUMBER
2133	

DATE MAILED: 04/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

	Application No.	Applicant(s)
Office Action Summary	10/032,859	GATHERER ET AL.
	Examiner	Art Unit	
	Esaw T. Abraham	2133	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on *11 April 2005*.

2a) ☐ This action is **FINAL**.   2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *1-7* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) *1-7* is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☒ The drawing(s) filed on *28 December 2001* is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a) ☐ All b) ☐ Some * c) ☐ None of:

      1. ☐ Certified copies of the priority documents have been received.

      2. ☐ Certified copies of the priority documents have been received in Application No. _____.

      3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *04/11/05*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____ .

Response to the applicant's amendments

A request for continued examination under 37 CFR 1.114, including the fee set forth in

37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible

for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been

timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR

1.114. Applicant's submission filed on 04/11/05 has been entered.

Response to the applicant's argument

The applicant argues that Wang does not teach or there is no suggestion of cascaded

MAP decoding. However, the examiner disagrees and although Wang et al. do not mention the

word "cascading" in the invention, the practice of cascading is deemed to be inherent to Wang et

al's decoder because by virtue of the fact the process of cascading "connecting an output of a

device into an input of another device, which then may be in turn be connected to another

device" is commonly employed by most of decoding systems including MAP decoders for

arranging data in series or in succession of stages so that each stage derives from or acts upon

product of the preceding. Therefore, the absence of the phrase "cascading architecture" as in

claim 1 does not make the claims allowable since cascading architecture is analogous or similar

to the MAP decoding of turbo coding of the prior art. Therefore, the applied references have

been applied appropriately.

The applicant further argues that Wang counts computations, not numbers of ACS units.

The examiner disagrees since Wang teaches that the forward (alpha) and backward (beta)

determined by series of multiplications (see expressions 17 and 18 of column 6 last paragraph

and column 7 lines 1-42) and further figure 2b teaches LLR calculators (see fig. 2b, element 260)

before they processed to extract extrinsic information that are sent to the other constituent

decoder (see col. 8, lines 6-15).

In response to the applicants' argument that the references fail to show certain features of

applicants' invention, it is noted that the features upon which applicant relies are not recited in

the rejected claim(s) (For example, the applicant contends that the prior art does not teach

"counting ACS". However, the quoted phrase is a non-claimed language). Although, the claims

are interpreted in light of the specification, limitations from the specification are not read to the

claims.

1.   Claims 1-7 remain pending.

Information Disclosure Statement

2.   The applicant's IDS of (04/11/05) have been entered. The examiner considers the IDS.

Drawings

3.   Figure 2e should be designated by a legend such as --**Prior Art**-- because only that which

is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR

1.121(d) are required in reply to the Office action to avoid abandonment of the application. The

replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR

1.84(c)) so as not to obstruct any portion of the drawing figures. If the examiner does not accept

the changes, the applicant will be notified and informed of any required corrective action in the

next Office action. The objection to the drawings will not be held in abeyance.

Claim objections

4.   Claims 1, 4 and 6 are objected to because of the following informalities:

Claim 1 recites, "A map decoder" in the preamble. CFR § 1.75 states that the

specification must conclude with a claim particularly pointing out and distinctly claiming the

subject matter, which the applicant regards as his invention or discovery. A map decoder does

not indicate what a subject matter the claims are directed to. The suggests that following ---A

Map decoder with cascaded architecture for reducing numbers of circuits ---

Claim 4 recites, "A map decoder" in the preamble. CFR § 1.75 states that the

specification must conclude with a claim particularly pointing out and distinctly claiming the

subject matter, which the applicant regards as his invention or discovery. A map decoder does

not indicate what a subject matter the claims are directed to. The suggests that following ---A

Map decoder for reducing numbers of circuits ---

Claim 6 recites, "A turbo decoder" in the preamble. CFR § 1.75 states that the

specification must conclude with a claim particularly pointing out and distinctly claiming the

subject matter, which the applicant regards as his invention or discovery. A turbo decoder does

not indicate what a subject matter the claims are directed to. The suggests that following ---A

turbo decoder with cascaded architecture for performing channel coding ---

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section

102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject

matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to

which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459

(1966), that are applied for establishing a background for determining obviousness under 35

U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. Claims **1-5** are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al.

(U.S. PN: 6,606,725).

As per claim **1**, Wang et al. teach or a matrix transform circuit and a method provides for

MAP decoding of turbo codes whereby the method initializing a forward recursion probability

function vector and a backward recursion probability function vector (see abstract). Further,

Wang et al. teach an apparatus (Map decoder or turbo decoder) for decoding a turbo-encoded

symbol sequence comprising the steps of a plurality of calculators for determining a plurality of

transition probability matrices for each received symbol of the sequence, the plurality of

probability matrices including a matrix; a first shift register, coupled to the plurality of

calculators, configured to store values of a forward recursion probability function; a second shift

register, coupled to the plurality of calculators, configured to store values of a backward

recursion probability function vector, the second shift register linked by a second multiplier; and

means for determining (output block) a log likelihood ratio for each decoded symbol in parallel

after receiving the complete symbol sequence (see claims 5-7). Wang et al. **do not explicitly**

teach cascade architecture. **However,** cascade architecture is known in the art of MAP decoding

or iterative decoding. **Therefore,** it would have been obvious to a person having an ordinary skill

in the art at the time the invention was made to include a cascade architecture for arranging data

in series or in a succession of stages so that each stage derives from or acts upon the product of

the preceding. **This modification** would have been obvious because a person having ordinary

skill in the art would have been motivated in order to achieve higher coding gains and lower

decoder complexities.

As per claim **2,** Wang et al. teach all the subject matter claimed in claim 1 including

Wang et al. teach a plurality of calculators for determining a plurality of transition probability

matrices for each received symbol of the sequence, the plurality of probability matrices including

a matrix; a first shift register, coupled to the plurality of calculators (first and second ACS units),

configured to store values of a forward recursion probability function vector; a second shift

register, coupled to the plurality of calculators (third and fourth ACS units), configured to store

values of a backward recursion probability function (see claim 5).

As per claim **3,** Wang et al. teach all the subject matter claimed in claim 1 including

Wang et al. in figure 2b teach, the decoder (210) include calculators (260) comprising values

temporarily be put in a storage elements (M) (250) below the corresponding calculators, before

they further processed to extract extrinsic information that are sent to the other constituent

decoder (see col. 8, lines 6-15).

As per claims **4 and 5,** Wang et al. teach the additional limitation of claim 4. The Map

decoder of Wang et al. teaches table A below lists a comparison on the forward-backward

recursion computations throughout successive M trellis states at arbitrary time k required by

different methods (see col. 9, last paragraph and claim 2).

6.   Claims **6 and 7** are rejected under 35 U.S.C. 103(a) as being unpatentable over Yagyu

(U.S. PN: 6,675,342) in view of Wang et al. (U.S. PN: 6,606,725).

As per claim **6,** Yagyu teach or disclose an iterative turbo decoding process utilizing

comparison algorithm is implemented by dividing each iteration step into two stages wherein

MAP-decoding is performed at each stage of the iteration step and the MAP-decoding produces

information sequences at each stage that are then subsequently summed and quantized into

binary (see col. 3, lines 27-33). Further, Yagyu in figure 1 disclose a first MAP decoder (106)

receiving data and extrinsic information sequence (k), a first interleaver (112) coupled to the

first MAP, a second interleaver (130) coupled to input X(k) for receiving symbols, a second

MAP decoder (114) coupled to the first and second interleavers, a deinterleaver coupled to an

output of said second MAP and a decision unit coupled to inputs of receiving symbols and

output of first MAP decoder (see elements 118,124 and col. 6, lines 5-34). Yagyu **does not**

explicitly teach that the first and second MAP decoders each include a forward and backward

recursion blocks. **However,** Wang et al. teach a method of MAP decoding of turbo codes

whereby the method initializing a forward recursion probability function vector and a backward

recursion probability function vector (see abstract). Further, Wang et al. teach an apparatus

(Map decoder or turbo decoder) for decoding a turbo-encoded symbol sequence comprising a

plurality of transition probability matrices including a matrix; a first shift register, configured to

store values of a forward recursion probability function; a second shift register, configured to

store values of a backward recursion probability function vector, the second shift register linked

by a second multiplier; and means for determining (output block) a log likelihood ratio for each

decoded symbol in parallel after receiving the complete symbol sequence (see claims 5-7).

Therefore, it would have been obvious to a person having an ordinary skill in the art at the time

the invention was made to implement the teachings of Yagyu including forward recursion and

backward recursion operations as taught by Wang et al. **This modification** would have been

obvious because a person having ordinary skill in the art would have been motivated in order to

reduce memory capacity and simplify the complicated data accesses (see col. 10, lines 20-26).

As per claim 7, Yagyu in view of Wang et al. teach all the subject matter claimed in

claim 6 including Yagyu in figure 1 disclosed the output of the deinterleaver (see the interleaver

coupled to the element 116) coupled to the extrinsic information of first MAP decoder (see

element 106 and L extrinsic (k)).

Conclusion

7.   Any inquiry concerning this communication or earlier communication from the examiner

should be directed to Esaw Abraham whose telephone number is (703) 305-7743. The examiner

can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are successful, the examiner's supervisor,

Albert DeCady can be reached on (703) 305-9595. The fax phone numbers for the organization

where this application or proceeding is assigned are (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding

should be directed to the receptionist whose telephone number is (703) 305-3900.

Esaw Abraham

Art unit: 2133

GUY LAMARRE
PRIMARY EXAMINER